A2 / cont'd / sub B6

55. (New) A system according to claim 38, wherein a gas or gas mixture with a composition different than that of the atmosphere is provided in the X-ray path to provide the transmissive characteristics that differ from atmospheric X-ray transmissive characteristics.

REMARKS

I. Status of the Claims

Claims 1-10 and 27-49 are currently pending in this application.

By this Amendment, claim 43 has been amended. Claims 50-55 have been newly added. New claim 50 is prior claim 11 which was inadvertently canceled. No new matter has been introduced by this Amendment. Entry and consideration of this Amendment are respectfully requested. Upon entry of this Amendment, claims 1-10 and 27-55 would be pending.

To assist the Examiner, attached to this Amendment is an "Attachment" that shows the amendments made to the claim 43 by bracketing the text that has been deleted and underlining the text that has been added.

II. Rejections under 35 U.S.C. §102

Claims 1-2, 7-8, 10, 27-29, 31-37, 43-45, and 48-49 have been rejected under 35 U.S.C. §102(e) as being anticipated by Toyota (U.S. Patent No. 6,295,334). Claims 1 and 2 have been rejected under 35 U.S.C. §102(b) as being anticipated by Tamura et al. (U.S. Patent No. 5,199,057). Claims 3-6 and 9 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Toyota in view of Cotter et al. (U.S. Patent No. 5,033,074). Applicants respectfully traverse the rejection of these claims, for the reasons set forth below.

Independent claim 1 is directed to a system having an X-ray source; an X-ray focusing element with an input and an output end, the input end in proximity to the X-ray source; and an aperture disposed on the output end of the focusing element so as to substantially block unfocused X-rays, while allowing substantially complete transmission of focused X-rays.

Applicants respectfully submit that neither Toyota nor Tamura disclose or suggests the claimed focusing element with an input and output end or aperture disposed so as to substantially block unfocused X-rays, while allowing substantially complete transmission of focused X-rays.

For example, Toyota generally shows a mirror 15 positioned to reflect radiation from a generator unit 1 to a window having arranged thereon a beryllium thin film 31. The Examiner asserts that the mirror 15 teaches the claimed X-ray focusing element. However, the mirror 15 of Toyota does not have an input and output end. Thus, Toyota also not disclose or suggest the focusing element with an input and output end or the input end in proximity to the X-ray source. The Examiner has not addressed this claimed feature in the Office Action.

Toyota also appears to be silent as to an aperture disposed so as to substantially block unfocused X-rays, while allowing substantially complete transmission of focused X-rays. The Examiner has not addressed this claimed feature in the Office Action.

Furthermore, the Examiner asserts that the reference numerals 2 and 31 refer to an X-ray source and aperture, respectively, in Toyota. However, in Toyota, the reference numerals 2 and 31 actually refer to a vacuum room and a beryllium thin film, respectively. Applicants respectfully request clarification as to which components of Toyota are being relied upon by the Examiner in his rejection of the claim.

As to Tamura, this reference generally shows a mirror 9 which condenses X-rays emitted from a target 5 and a field diaphragm 11 in which the aperture diameter is changed in accordance with the observation magnification. As with Toyota, the mirror 9 of Tamura does not have an input and output end. Thus, Tamura does not disclose or suggest the X-ray focusing element with an input and output end or the input end in proximity to the X-ray source.

Tamura also appears to be silent as to an aperture disposed so as to substantially block unfocused X-rays, while allowing substantially complete transmission of focused X-rays. The Examiner has not addressed this claimed feature in the Office Action.

In view of the foregoing, claim 1 and its dependent claims are not anticipated by either Toyota or Tamura and are patentably distinguishable over these cited references.

Independent claim 6 is directed to a microscopic X-ray fluorescence system having an X-ray focusing element with an input and an output end and an aperture substantially blocking unfocused X-rays, while allowing substantially complete transmission of focused X-rays. As discussed above for claim 1, these features are not disclosed or suggested by Toyota. Accordingly, claim 6 is not anticipated by Toyota and is patentably distinguishable over the cited reference.

Independent claim 7 is directed to an aperture in an X-ray fluorescence system in which the aperture substantially blocks unfocused X-rays in the X-ray fluorescence system. As discussed above for claim 1, Toyota generally shows a mirror 15 positioned to reflect radiation from a generator unit 1 to a window having arranged thereon a beryllium thin film 31. Toyota is silent as to an aperture which substantially blocks unfocused X-rays. As with the various

limitations of claim 1, the Examiner has not addressed this feature in the Office Action. Accordingly, claim 7 and its dependent claims are not anticipated by Toyota and are patentably distinguishable over these cited reference.

Independent claim 27 is directed to a system having an X-ray element with a first end and a second end, an aperture disposed on the second end of the element, and a vacuum source connectable to the aperture for evacuating the aperture.

Toyota does not disclose or suggest a vacuum source connectable to the aperture for evacuating the aperture. The Examiner admits that Toyota does not explicitly disclose a vacuum source, but generally asserts that a vacuum source is inherent in Toyota. Irrespective of the Examiner's inherency argument, Toyota is still silent as to the claimed connection relationship between the source and aperture, e.g., a vacuum source connectable to the aperture. The Examiner has not addressed this feature in the Office Action.

Accordingly, claim 27 and its dependent claims are not anticipated by Toyota and are patentably distinguishable over the same.

Independent claim 36 is directed to an X-ray path having an X-ray focusing element with an input end and an output end. As discussed above for claim 1, these features are not disclosed or suggested by Toyota. Accordingly, claim 36 is not anticipated by Toyota and is patentably distinguishable over these cited reference.

Independent claim 37 is directed to an X-ray path having an X-ray detector, a detector aperture vacuum sealed to the X-ray detector, and a vacuum source connectable to the

X-ray path for evacuating the path. As discussed above for claim 1, Toyota generally shows a mirror 15 positioned to reflect radiation from a generator unit 1 to a window having arranged thereon a beryllium thin film 31. These portions of Toyota relied upon by the Examiner are directed to the application of radiation onto a substrate 51, rather than any detection of radiation. Toyota appears to be silent as to the X-ray detector. The Examiner has not addressed this feature in the Office Action. Accordingly, claim 37 and its dependent claims are not anticipated by Toyota and are patentably distinguishable over these cited reference.

Independent claim 43, as amended, is directed to a method involving positioning a sample for X-ray illumination by the X-ray fluorescence system, evacuating an X-ray focusing element with a vacuum source, illuminating the sample with X-rays focused by the X-ray focusing element while the sample remains at atmospheric pressure, and detecting X-ray fluorescence from the illuminated sample.

On the contrary, Toyota is directed to an arrangement for radiating a substrate 51, and is silent as to any detection of X-ray fluorescence. Further, Toyota is silent as to the sample remaining at atmospheric pressure during the illumination of the sample with X-rays. The Examiner alleges that the reference discloses a sample holder holding mask and substrate outside of the vacuum duct at atmospheric pressure, but provides no support in Toyota for this allegation. Applicants respectfully request the Examiner to identify with particularity where Toyota teaches or suggests a sample remaining at atmospheric pressure.

Accordingly, claim 43 and its dependent claims are not anticipated by Toyota and are patentably distinguishable over these cited reference.

III. Rejections under 35 U.S.C. §103

Claims 27, 30, 38-43, and 46-47 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Foote et al. (U.S. Patent No. 5,847,388). Applicants respectfully traverse the rejection of these claims, for the reasons set forth below.

Independent claim 27 is directed to an X-ray fluorescence system having an X-ray element with a first end and a second end, an aperture disposed on the second end of the element, and a vacuum source connectable to the aperture for evacuating the aperture.

As acknowledged by the Examiner, Foote does not disclose or suggest a vacuum source or the evacuation of the aperture. The Examiner, however, asserts the following:

> Official Notice is taken that the use of vacuum environment in X-ray beam paths is notoriously well known and it would have been obvious to one of ordinary skill in the art to evacuated the tapered aperture of Foote et al. to decrease X-ray attenuation by atmospheric gases. The application of Foote et al.'s teachings to X-ray fluorescence analysis would have been obvious to one of ordinary skill in the art given the similarities to the detecting systems regardless of the origin of X-rays motivated by the inherent benefits to radiation throughput and scatter elimination. (Office Action, page 4)

Applicants respectfully traverse the taking of Official Notice as applied to the various pending claims and request the Examiner to provide objective evidence in the prior art for his assertions. See MPEP 2144.03.

Furthermore, Toyota does not disclose or suggest a vacuum source connectable to the aperture for evacuating the aperture. The Examiner's Official Notice taking still does not address the claimed connection relationship between the source and aperture, e.g., a vacuum

source connectable to the aperture. The Examiner has not addressed this feature in the Office Action.

In addition, absent impermissible hindsight, one of ordinary skill in the art would not modify Foote in the manner suggested by the Examiner. For example, Foote simply shows an arrangement for detecting X-rays via a detector tube and a two-piece collimator with a removable extension. The Examiner's taking of Official Notice and alleged general knowledge of one skilled in the art, at the time the invention was made, to modify Foote are overly broad and unsupported by any evidence in the prior art. No objective evidence has been supplied by the Examiner as to the application of vacuum evacuation for an X-ray detection arrangement, as in Foote. It is apparent that the Examiner is relying upon the Applicant's own teachings in the disclosure (e.g., Application, page 16, lines 12-20 and page 18, lines 11-13) and is employing Applicant's claim as a blue print to reconstruct impermissibly the claimed invention.

Accordingly, claim 27 and its dependent claims are patentably distinguishable over Foote.

Independent claim 38 is directed to an X-ray fluorescence system having a detector, and an aperture cooperating with the detector to provide an X-ray path. The X-ray path has X-ray transmissive characteristics that differ from atmospheric X-ray transmissive characteristics.

For similar reasons as set forth above for claim 27, claim 38 and its dependent claims are patentably distinguishable over the cited reference.

Independent claim 43, as amended, is directed to a method involving positioning a sample for X-ray illumination by the X-ray fluorescence system, evacuating an X-ray focusing element with a vacuum source, illuminating the sample with X-rays focused by the X-ray focusing element while the sample remains at atmospheric pressure, and detecting X-ray fluorescence from the illuminated sample.

Foote, as relied upon by the Examiner, shows a two-piece collimator attached to a detector tube which is primarily directed to a detection arrangement. There is nothing in Foote suggesting that the collimator performs any X-ray focusing. The Examiner also has not addressed this feature in the Office Action with sufficient particularity. As such, Foote does not disclose or suggest an X-ray focusing element or the evacuation of such an element with a vacuum source. The alleged well-known art does not remedy the deficiencies in the Foote teaching.

Furthermore, the claimed positioning, evaluating and illuminating steps relate to the application of X-rays onto a sample. The portions of Foote cited by the Examiner (e.g., collimator and detector tube) involve detection of X-rays from a specimen, and not the application of X-rays onto a sample. As such, Foote also does not disclose or suggest the above-noted features. The alleged well-known art does not remedy the deficiencies in the Foote teaching.

Foote is also silent as to a sample remaining at atmospheric pressure during the illumination of the sample with X-rays. The Examiner has not addressed in the Office Action where Foote teaches or discloses that the specimen 18 is maintained at atmospheric pressure. Applicants respectfully request the Examiner to identify with particularity where Foote teaches or suggests a sample remaining at atmospheric pressure.

Accordingly, claim 43 and its dependent claims are patentably distinguishable over Foote.

CONCLUSION

Based on the foregoing amendments and remarks, Applicants respectfully request reconsideration and withdrawal of the rejection of claims 1-10 and 27-49 and allowance of this application.

AUTHORIZATION

The Commissioner is hereby authorized to charge any additional fees which may be required for consideration of this Amendment to Deposit Account No. 13-4503, Order No. (4451-4001) 0755-4112US1. A DUPLICATE OF THIS DOCUMENT IS ATTACHED.

In the event that an extension of time is required, or which may be required in addition to that requested in a petition for an extension of time, the Commissioner is requested to grant a petition for that extension of time which is required to make this response timely and is hereby authorized to charge any fee for such an extension of time or credit any overpayment for an extension of time to Deposit Account No. 13-4503, Order No. (4451-4001) 0755-4112US1. A DUPLICATE OF THIS DOCUMENT IS ATTACHED.

Respectfully submitted,
MORGAN & FINNEGAN

Dated: November 7, 2002

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Frank H. FERRANDINO et al.

Serial No.: 10/024,064 Group Art Unit: 2882

Filed: December 18, 2001 Examiner: David P. PORTA

For: X-RAY FLUORESCENCE SYSTEM AND METHOD

ATTACHMENT

Amendments made to the claim 43 herein are indicated in this attachment by bracketing the text that has been deleted and underlining the text that has been added.

IN THE CLAIMS:

Please note the following changes to claim 43.

43. (Amended) A method for detecting elements with low atomic numbers in an X-ray fluorescence system comprising:

positioning a sample for X-ray illumination by the X-ray fluorescence system;

evacuating an X-ray focusing element with a vacuum source; [and]

illuminating the sample with X-rays focused by the X-ray focusing element while the sample remains at atmospheric pressure; and

detecting X-ray fluorescence from the illuminated sample.

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